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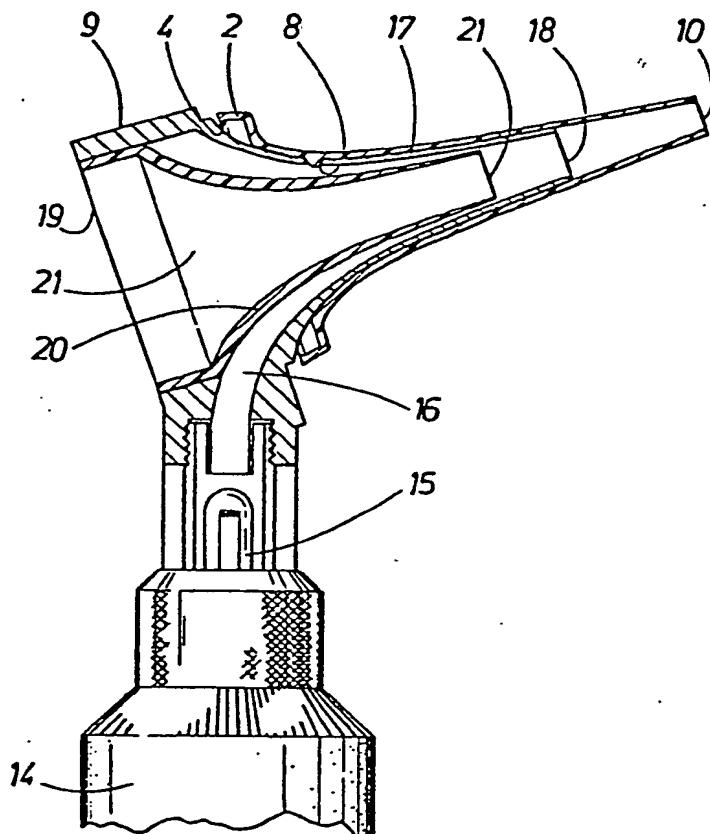


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <p>(54) Title: AN INTERCHANGEABLE FUNNEL FOR ATTACHMENT TO INSTRUMENTS USED FOR THE DIAGNOSTIC AND TREATMENT OF OPENINGS TO BODY CANALS</p> | | | |

(57) Abstract

A funnel for attachment to medical instruments used for the diagnosis and treatment of openings to body canals. The funnel is so arranged as to be attached to a head (9) of the instrument of at least two different types, of which one head exhibits an annular flanged part and the other head (9) exhibits a funnel-shaped part with a groove (8). The aforementioned funnel exhibits a small front opening (10) and a larger rear opening, together with a transcurrent hole between them. The funnel is provided at its larger end with an edge part (2) extending around the opening, said edge part being so arranged as to engage by means of a snap-in lock around the flange part (21) on the first head. The inside of the funnel is also provided with a bead so arranged as to fit into the groove (8) on the second head (9), whereby the funnel is able as a single design to be used for both the aforementioned types of head.



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Title:

An interchangeable funnel for attachment to instruments used for the diagnosis and treatment of openings to body canals.

Technical field:

The present invention relates to an interchangeable funnel for attachment to instruments for the diagnosis and treatment of openings to body canals in accordance with the introductory part of the following Patent Claim 1.

Background:

For the purpose of diagnosing and treating the ears, for example, use is made of an ophthalmoscope, an instrument which is also known as an otoscope, to the head of which a disposable funnel is fitted. These heads are available in several different models which incorporate various types of means for locking the funnel securely in position. A previously disclosed funnel is secured to the head by means of a snap-in lock, whilst a second type of funnel is secured by causing a bead arranged on the funnel to rotate in a groove on the head. This means that different funnels are required for different types of head. The object of the present invention is to make available a funnel for the diagnosis and treatment of openings to body canals which can be combined with different types of head.

The solution:

The aforementioned object is achieved by means of a funnel in accordance with the present invention, which is characterized in that the funnel is provided at its larger end with an edge part extending around the opening so arranged as to engage by means of a snap-in lock around the flange part on the first head, and in that the inside of the funnel is provided with a bead so arranged as to fit into the groove on the second head, whereby the funnel is able as a single design to be used for both the aforementioned types of head.

Brief description of drawings:

The invention is described below in greater detail as an illustrative embodiment with reference to the accompanying drawings, of which Fig. 1 shows a side view of a funnel in accordance with the invention, Fig. 2 shows a view of the funnel at an angle from the front, Fig. 3 shows a section III-III through the funnel, Fig. 4 shows on an enlarged scale a partially cut-away section III-III through the edge part of the funnel, Fig. 5 shows on an enlarged scale a partially cut-away section III-III through the edge part of the funnel in accordance with a second embodiment, Fig. 6 shows an otoscope with a section of a head intended for a funnel with rotating locking, Fig. 7 shows a view from above of a head with rotating locking, and Fig. 8 shows a side view of a head with snap-in locking in which the funnel is indicated by dotted and dashed lines.

Best mode of carrying out the invention:

As will be appreciated from the example illustrated in Figs. 1-4, the funnel, referred to below as the combination funnel, exhibits an outwardly smooth, conical body 1 which is terminated at its broader end by a straight edge 2 and is open at both ends. The inside 3 of the edge 2 is terminated by a peripheral bead 4 so arranged as to snap into engagement in a concave groove 5 on a head 6 of an ophthalmoscope or otoscope, that is to say an instrument for the diagnosis and treatment of canals in the ear and nose or similar. A further bead 7 is so arranged on the inside of the tapering part of the funnel as to form an angle in relation to the line of the edge and is executed to fit in a groove 8 on a second head 9 of an otoscope of a different design, which is described in greater detail below. As has already been stated, the funnel exhibits a small opening 10 at the front and a larger opening 11 at the rear. The front opening 10 is designed to be introduced into the actual body canal, whilst the rear opening is designed to face towards the head 6 or 9 of the instrument. The funnel exhibits strictly conical

form from the geometrical point of view at the front for a certain distance ahead of the bead 7, when viewed from the front opening 10 whereupon the funnel changes to exhibit a progressively increasing cross-sectional area by following a curved contour line 12 so as to change to a radial and essentially flat annular surface 13 in conjunction with the edge part 2. The inside 3 of the edge part 2 in the example illustrated exhibits the form of the generating surface of a truncated cone facing in the same direction as the cone constituted by the funnel as a whole, whereby the funnel exhibits an increasing diameter in a direction from its smaller end 10 as far as the peripheral bead 4, where the internal diameter again reduces over a short distance. With the exception of the peripheral bead 4 the funnel exhibits to all intents and purposes a uniform thickness of material, so that the contour form of the funnel has the same curvature both on its inside and on its outside, but with the bead 7 representing an exception to this.

Shown in Fig. 6 as a partially cut-away view is the otoscope with the head 9 for rotating locking of the funnel. The head is attached to a handle component 14 which serves at the same time as a battery holder for a battery for powering a light source 15 in the form of an incandescent lamp situated at the upper end of the holder. The head is screwed onto the handle component and contains a fibre optics system 16 which conducts the light from the light source in the direction of the front opening 10 of the funnel. The head 9 of the model illustrated in Fig. 6 exhibits a funnel-shaped component 17 with a front opening 18 and a considerably larger rear opening 19. Internally the head similarly exhibits a funnel-shaped component 20, the front opening 21 of which is situated inside the opening 18, whilst the rear opening 19 is common to the two funnel-shaped components. There extends between the openings 18 and 19 a transcurrent hole 21, through which diagnosis and treatment are performed.

Shown in Fig. 8 is the head 6 for the snap-in locking of the funnel in accordance with the invention. This head has no

funnel-shaped component, but is executed essentially in the form of an annular flange with a transcurrent hole, inside which a light source in the form of an incandescent lamp 22 is attached in a lamp holder 23 which is situated inside the transcurrent hole. The front, annular flange part 24 of the head 6 constitutes a means of attachment for the funnel. The flange part 24 exhibits an annular, for example concave, groove 25 intended to interact with the peripheral bead 4 on the funnel. The flange part 24 exhibits outside the groove 25 an annular part 26 in the form of the outer surface of a cone, which corresponds in its form and dimensions to the inside 3 of the edge part of the funnel. The handle component is not shown in Fig. 8 for the sake of simplicity, although this may exhibit the same external appearance as the handle component in accordance with Fig. 6, although the latter does not contain any light source, but simply an electrical connection device designed to fit the electrical connection pin 27 via which the power supply to the light source 22 is provided.

A second embodiment of the combination funnel is shown in Fig. 5, which also exhibits a smooth, conical body 30 which is terminated at its wider end by a slightly curved edge part 31 and is open at both ends. The edge part is terminated by a straight edge which is also executed on the inside in the form of a bead 32 so arranged as to provide a snap fit in the concave groove 5 in the head 6 of the ophthalmoscope or otoscope. The inside of the edge part exhibits a straight cylindrical generating surface 33 relative to the straight edge part of the opening and a generating surface 34 with the form of a truncated cone set at an angle to the latter generating surface. In other respects this funnel is executed in the same fashion as the combination funnel previously referred to.

By executing the funnel in the fashion described above, it is thus possible for one and the same funnel to be used for two different types of heads for the otoscope instrument. Where the instrument in accordance with Figs. 6 and 7 is used with a funnel-shaped component 17, the interchangeable funnel, which in

practice is a disposable funnel which is used once only, is pushed onto the funnel-shaped part of the head whilst being rotated, causing locking to occur as the bead 7 on the inside of the funnel is introduced into the angled groove 8 on the funnel-shaped component 17 of the head. By executing the groove at an angle, the bead 7 acts in conjunction with the groove 8 in the same way as the interaction between the threads on a bolt and a nut, which means that the funnel is pushed further in on the funnel-shaped part of the head until the funnel, as may be appreciated from Fig. 6, makes contact with its inside against the outside of the funnel-shaped part. As will be appreciated from this Figure, the edge part 2 of the funnel is not used in this instance, but is in no sense in the way because the edge part 2 does not come into contact with any part of the head 9. The peripheral bead 4 may possibly come into contact with the surface of the funnel-shaped part 17, which only produces a stabilizing effect for the funnel. The funnel thus acts as a hygienic barrier which is replaced on each occasion before examining a patient's auditory canal, nasal canal or similar, in conjunction with which the canal is illuminated by the directional beam of light from the light source 15 via the fibre optics system 16. The illuminated area can be studied freely by the doctor looking at the area concerned through the opening 19. For the sake of good order it must be pointed out that the funnel is also known as the speculum.

One and the same funnel can thus find an application also when using an otoscope instrument with a head 6 of the type illustrated in Fig. 8. In this case neither the conical part of the funnel nor the part with a curved contour is used as the supporting surface against any funnel-shaped part of the head, with attachment instead taking place only with the flanged part 24, for which purpose use is made of the edge part 2 of the funnel. All that is required in this case is simply for the edge part 2 of the funnel to be pushed over the flange part 24 of the head 6, so that the peripheral bead 4 snaps into engagement with the annular groove 25 so as to provide support on the one hand

with the outside 3 of the edge part 2 in the form of the outer surface of a cone, and on the other hand with the surface 13 which extends in the radial plane and which makes contact with a forward-facing edge 28 of the flange part 24. Very stable and reliable attachment is achieved in this way, without the other bead 7 being utilized for locking. In this case, too, the body canal in question is illuminated by directing a beam of light through the funnel and out via its front end 10 from the incandescent lamp 22, in conjunction with which the illuminated area is observed by the doctor through the transcurrent hole in the head 6 and through the similarly transcurrent hole in the funnel.

By executing the inside of the edge part 31 with two generating surfaces set at an angle relative to one another, the grip on the flange part 24 is increased, when the force generated essentially by the snap-in effect is directed essentially at right-angles to the aforementioned flange part. Furthermore the straight cylindrical generating surface 33 permits greater adaptability to the different types of flange parts which may be encountered on variants of the head 6, so that the entire area of the generated surface can be utilized to provide contact with the flange part without affecting the grip of the funnel on the flange part. The contact between the generating surface and the aforementioned flange part is thus restricted on one side by the peripheral bead 32 and on the other side by the angled generating surface 34.

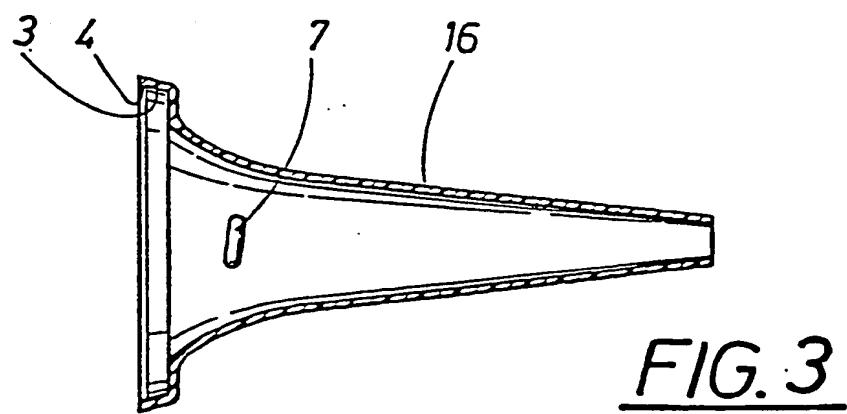
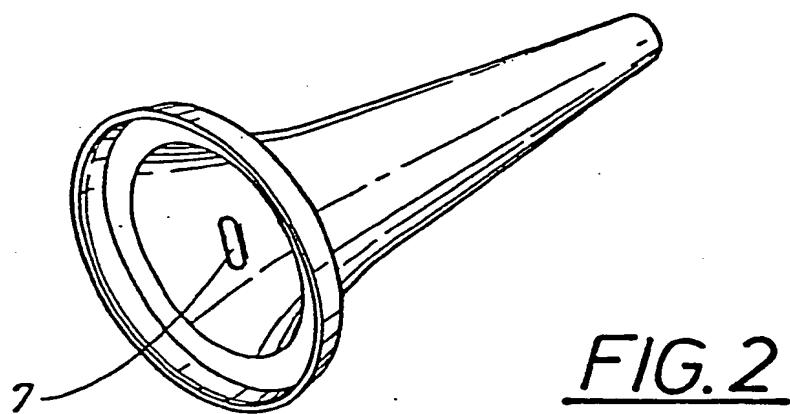
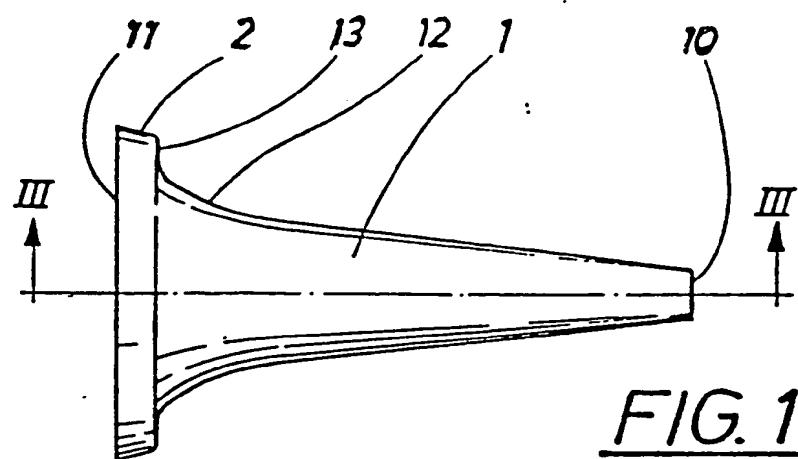
The funnel is preferably executed in a plastics material having appropriately dimensioned flexibility such that the peripheral bead 4, for example, is flexible yet provides a distinct snap-in engagement position. Similarly, the bead 7 for the attachment groove 8 should be permitted by the general elastic flexibility of the funnel to flex and to snap into engagement in the groove 1. The funnel should preferably be executed in polypropylene, which possesses a low coefficient of friction; this material, when injection moulded, produces very few burrs. This latter characteristic is significant, since

burrs give rise to reflections inside the funnel which impair the quality of the view through the funnel. Another important factor with regard to the elimination of the risk of burrs being formed in the course of the injection moulding process is the special method of injection moulding which is used in this case, in conjunction with which an injection moulding tool with special parting of the mould and with vent ducts is used. It is also advantageous to execute the funnel with a glossy outside surface which feels comfortable to the skin, and with a matt inside surface which further reduces the risk of reflections on the inside. Polypropylene is a material which also tolerates high temperatures and which offers particular advantages in view of the fact that the funnel is accordingly able to be sterilized after it has been injection moulded.

The invention is not restricted to the illustrative embodiment described above and portrayed in the drawings, but may be modified within the scope of the following Patent Claims. For example, the funnel may be provided with further types of locking arrangements which will fit other types of head. The funnel can be executed in different lengths to suit different applications. A long funnel, for example, will thus eliminate the risk of wax from the ear finding its way into the instrument.

Patent Claims:

1. A funnel for attachment to medical instruments used for the diagnosis and treatment of openings to body canals so arranged as to be attached to a head (6, 9) of the instrument of at least two different types, of which one head (6) exhibits an annular flanged part (24) and the other head (9) exhibits a funnel-shaped part (12) with a groove (8), in conjunction with which the funnel exhibits a small front opening (10) and a larger rear opening (11) together with a transcurrent hole between them, characterized in that the funnel is provided at its larger end (11) with an edge part (2) extending around the opening so arranged as to engage by means of a snap-in lock around the flange part (21) on the first head (6), and in that the inside of the funnel is provided with a bead (7) so arranged as to fit into the groove (8) on the second head (9), whereby the funnel is able as a single design to be used for both the aforementioned types of head.
2. A funnel according to Patent Claim 1, characterized in that there is present on one end of the funnel an edge bead (4) so arranged as to snap into engagement in the flange part (24).
3. A funnel according to Patent Claim 1, characterized in that the bead (7) arranged on the inside of the funnel is angled in relation to the line of the edge of the funnel.
4. A funnel according to Patent Claims 1 and 2, characterized in that the funnel is provided at its larger end (11) with an edge part (2) extending around the opening exhibiting a straight cylindrical generating surface (33) and a conical generating surface (34) set at an angle to the line of said straight cylindrical generating surface and so arranged as to engage by means of a snap-in lock around the flange part (21) of the first head (6).



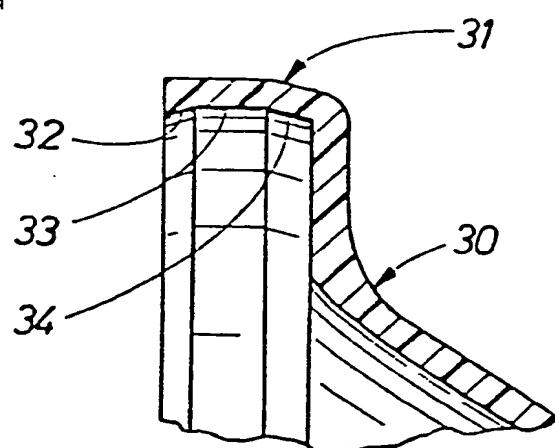
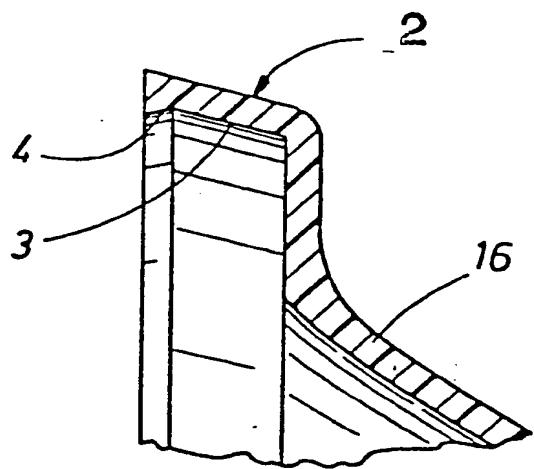


FIG.4

FIG.5

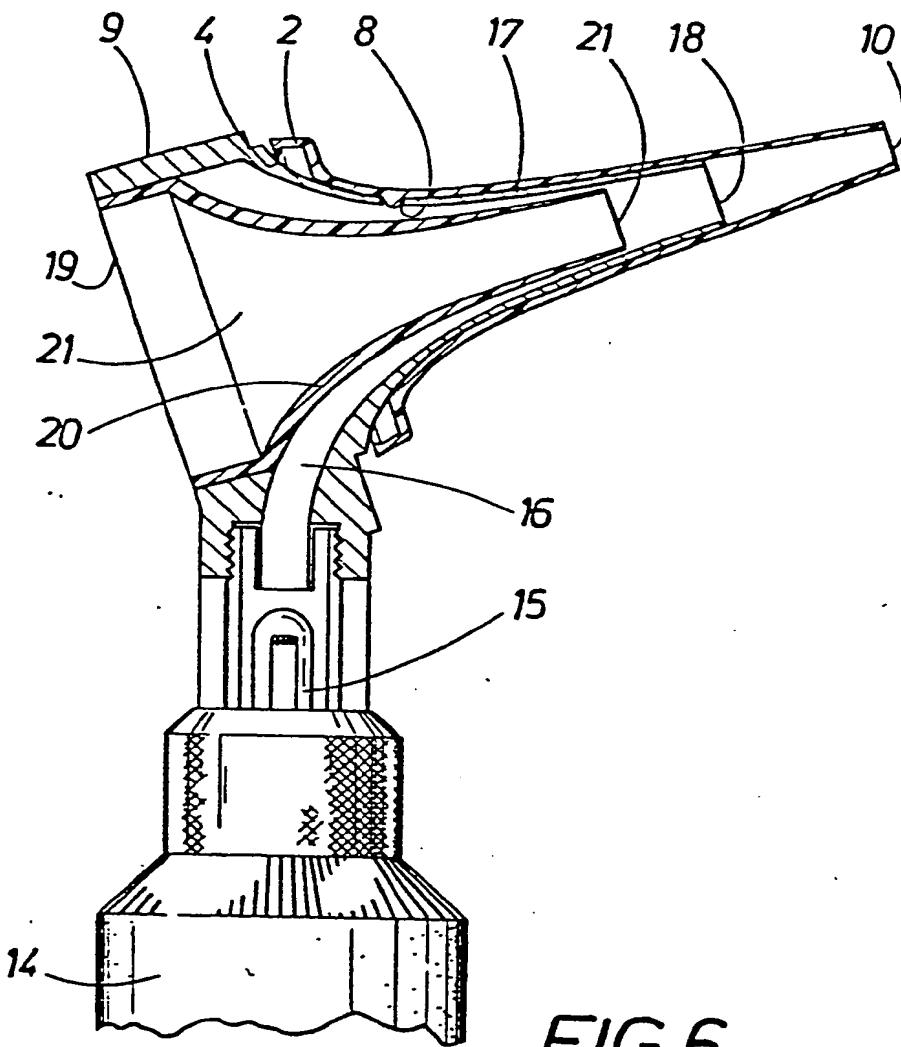


FIG.6

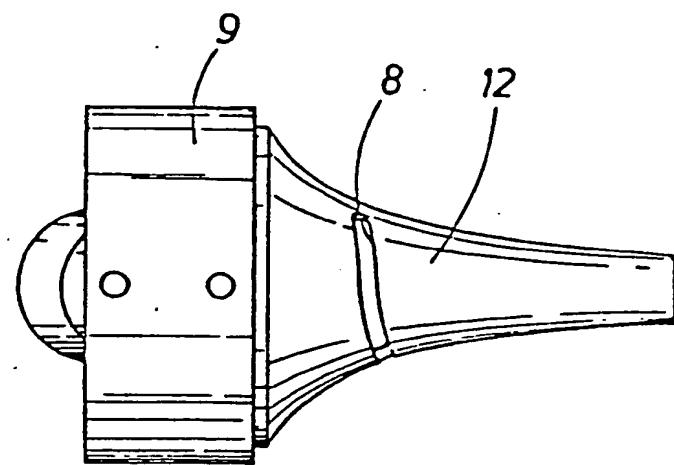


FIG. 7

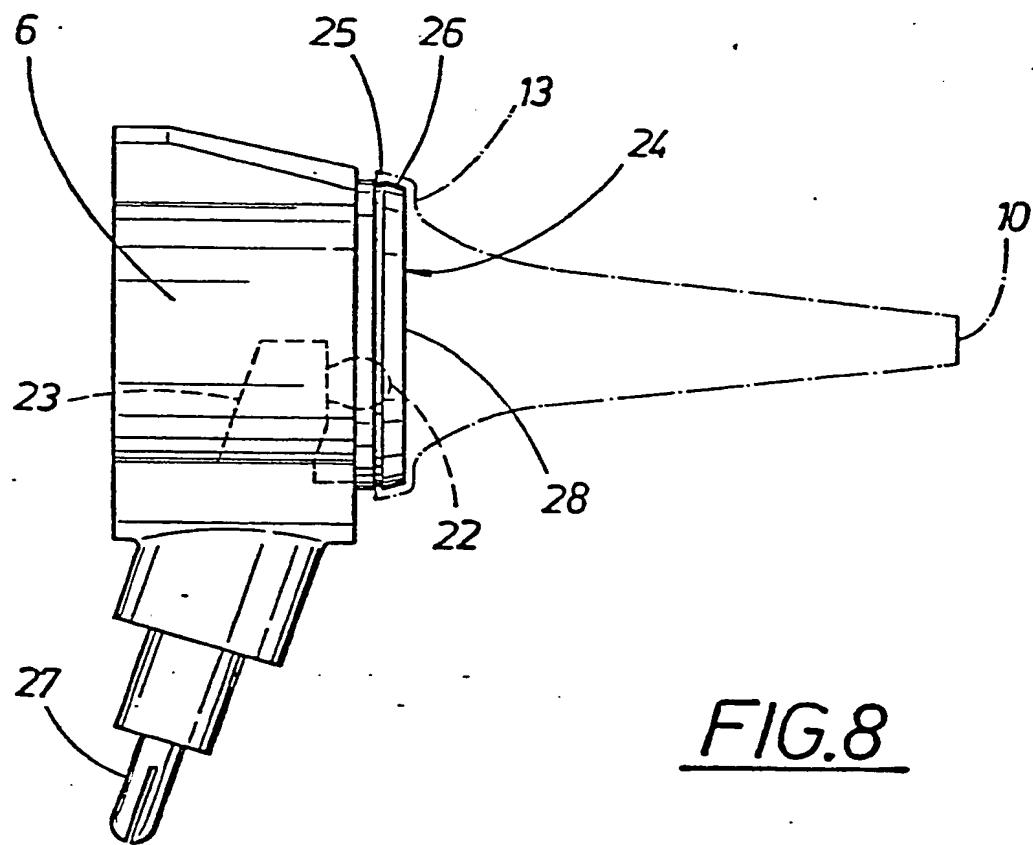


FIG. 8

INTERNATIONAL SEARCH REPORT

International Application No

PCT/SE85/00384

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)⁶
According to International Patent Classification (IPC) or to both National Classification and IPC 4

A 61 B 1/22

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

| Classification System | Classification Symbols |
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| IPC 4 US Cl | A 61 B 1/00, /06, /22, 5/12 <u>128</u> :2 Z, 3, 4, 6, 9, 746 |

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SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT*

| Category ⁹ | Citation of Document, ¹⁰ with indication, where appropriate, of the relevant passages ¹¹ | Relevant to Claim No. ¹² |
|-----------------------|---|-------------------------------------|
| Y | DE, A1, 2 029 892 (WELCH ALLYN, INC.) 15 April 1971 & GB, 1264725 US, 3698387 | 1-4 |
| Y | DE, A1, 2 403 882 (OPTOTECHNIK HEINE KG) 4 September 1975 & US, 3840004 | 1-4 |
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IV. CERTIFICATION

Date of the Actual Completion of the International Search

1985-12-12

Date of Mailing of this International Search Report

1986-01-02

International Searching Authority

Signature of Authorized Officer

Swedish Patent Office

Gunnar Hildorot
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